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John Charsley – Beaconsfield
nephew to the author –

AN ESSAY, TO INVESTIGATE THE CAUSES OF THE *GENERAL MORTALITY* BY FEVERS,

DEDUCED FROM THE KNOWLEDGE
OF THE NATURE OF THE BLOOD
AND THE CIRCULATION;

WITH

MISCELLANEOUS OBSERVATIONS

ON

ANCIENT AND MODERN WRITERS.

By W. CHARSLEY, M. D.

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To the *KING.*

SIRE,

IT is an heart-felt ſatisfaction, that every tendency to promote the health and welfare of your Majeſty's ſubjects is ſtamped with the ſanction of your Majeſty's paternal care and goodneſs.

This is the ground on which I preſume to hope you will permit me to lay this Eſſay at your Majeſty's feet; to offer up my moſt grateful acknowledgements for the many gracious fa-

vours received from part of your **Royal Family**; *and to add, with the moſt dutiful reſpect, that I am,*

SIRE,

Your Majeſty's

Moſt faithful

Obedient Subject

And Servant,

WILLIAM CHARSLEY.

INTRODUCTION.

THE publick being generally prepoſſeſſed in favour of writers who avoid prolixity, I have endeavoured to profit by this idea; and have prefaced this little work by obſerving, though this ſubject is a large field for enquiry, it is treated in as compendious a manner as poſſible. I have endeavoured to collect the opinions of authors who have mentioned theſe ſubjects. Among the various writers on the circulation of the blood, it's velocity, it's momentum, &c. &c. Dr. Keil ſtands foremoſt in point of accuracy; but though their hypotheſes are ingenious

ous and pleaſing, they are the leſs ſatisfactory, by leaving the matter in an uncertainty, not agreeing in their calculations and demonſtrations.

The knowledge of the circulation of the blood being eſſentially neceſſary to the cure of diſtempers, it is more eſpecially ſo to the cure of Fevers, diſeaſes which carry off the bulk of mankind; Fevers often originating from ſmall cauſes, not enough attended to either by thoſe affected by them, or by young practitioners, who rely too much on their knowledge of the theory of phyſick (wandering like men in the dark bewildered) till time, practice, and experience, enlighten them. Many occaſions have occurred to me of making ſuch kind of remarks in a long courſe of practice; twenty years of which were employed, by command of his late Royal Highneſs the Duke of Cumberland, in the care of the detachments at Windſor.

SENSIBLE that the world is apt to aſcribe to vanity moſt publications, the acknowledgment, how inadequate I am to this taſk, will, I flatter myſelf, exempt me from that imputation; yet that philanthropy and benevolence, ſo conſpicuouſly known to be inherent in the Royal Breaſt, diffuſing itſelf through all degrees of people, and of whom it may be truly ſaid in the words of Buchanan, "In quo vera "Dei vivenſque elucet imago," encouraged my wiſhes that an endeavour of this ſort might be acceptable;

able; that it might ſerve as an outline for an abler pen to finiſh; and, if any future benefit ſhould accrue to the publick, I ſhall be happy in the reflection of its being a debt due to humanity.

ERRATA.

Page 26, line 18, for *capillary*, read *capillaries*.

Page 57, Greek line, at the bottom, read as follows:

Τὰ ὀξέα τῶν νȣσημάτον κρὶνεται ἐν ταῖς τεσσαρεσκαὶδεκα ημέρησι. Hippocr. Aphor. xxiii. lib. ii.

Page 61, Greek, line 4, for ἰποστροφὰς, read ὑποστροφὰς.

AN

ESSAY, &c.

SECT. I.

IT being unneceſſary to enter into an anatomical deſcription of ſanguification and the circulation, it is ſufficient to premiſe, that the chylous juice extracted from the aliments in the ſtomach, and elaborated by the action of the organs of digeſtion, paſſing through the primæ viæ, and mixing with the bile and pancreatick juices, is, by the periſtaltick motion of the bowels, preſſed on through the lacteal veins, and in its courſe through its proper receptacles till it arrives at the ſubclavian vein, when it is perfected and aſſimilated into that ſoft nutritious liquid, fit for the nouriſhment, growth, and increaſe of the human body, which, when become blood, is carried from the heart by the arteries to the extreme parts of the body, diſtributed by collateral branches through all its parts, and brought back to the heart by the veins.

Whilſt the blood continues to flow with an uniform equal movement through the veſſels, which the ancients expreſſed by the metaphorical word Πγθμος, the animal body may be ſaid to be in an healthy ſtate; but when the circulation is from any cauſe interrupted, the animal functions are not duly performed, various acute and chronical diſorders enſue.

Now the mean quantity of blood paſſing through the heart in an hour, is ſuppoſed to be about 250 lb. which muſt be conſidered only as the quantity carried from the aorta and larger arteries, and is returned by the larger veins to the cava back to the heart; it appearing by calculation that the blood paſſes about 5233 times ſlower in its return thro' the extremities than the quantity paſſing through the heart in a given time; for according to Dr. Keil and others, the farther the blood moves from the heart, the ſlower it returns, and all the blood, which at the ſame time is thrown out of the heart, does not return at the ſame time again, but the times are directly as the ſpaces the blood runs over before it returns to the heart again, and reciprocally as the velocities. From the above it will appear, that 4 lb. 6 oz. or thereabout, will paſs every minute through the heart, and that the ſame quantity, 4 lb. 6 oz. muſt neceſſarily return upwards of ſeventy times, whilſt the maſs is once returning through the ramifications of the arteries in the extremities, agreeable to the eſtabliſhed axiom, that the celerity with which liquids paſs through canals is as their quantities and reſiſtances.

In this manner is the blood carried to the extreme parts of the body;—next let us enquire into the manner of its return to the heart through the veins.

The ancient writers were of opinion the motion of the blood was continued through its circular courſe by the ſole energy and active force of the heart and arteries; but this doctrine being combated by ſome modern writers, without reaſons for ſuch opinions ſufficiently concluſive, how, or in what manner the venal circulation is performed, I ſhall preſume to offer ſome reaſons to ſupport my opinion, in what manner the blood is carried back from the extreme parts by the veins to the heart, to render the circulation through the animal ſyſtem complete.

1*ſt*, It is a ſelf-evident propoſition, that the force of the heart and arteries extends as far as their vibrations and pulſations are perceptible; that their elaſticity, inceſſant motion, and preſſure of the ambient parts, conduce to tranſmit the blood to the extreme parts, even to the divarications entering and ending in the muſcular fibres, which are ſeen in injected bodies.

2dly, It may be aſked, to what end or purpoſe has Nature formed the left ventricle of the heart thicker and ſtronger than the right? If it is to prevent a ſuffocation the heart is liable to from particular cauſes, as has been ſuppoſed, then it implies a neceſſity for ſuch formation, to fit it for ſuch an exertion of power that will enable it to propel each ſucceeding column of blood, which, for want of ſuch force, would choak up its receſſes, and induce that ſuffocation.

3dly, It may be aſked, to what end or purpoſe are the arteries framed of a firmer and ſtronger texture than that of the veins? or why act with more power near the heart than at a farther diſtance? which is proved by the velocity decreaſing in proportion to the diſtance from that ſource, and the increaſe of the number of ramifications: the anſwer is too plain to want any ecclairciſſement. Again, it is owing to an impulſive power, that room is made in the cavities of the heart for each portion of blood ſucceſſively pouring in from the vena cava; and it is well known, too, that fluids paſs through tubes ſo much the more eaſy, as they flow from a ſmaller ſection to a larger, aſſiſted by the force of the ſubſequent column; and to this alſo may be added, the oſcillatory motion of the fibres and contractibility of the veſſels. How far preſſure of the ambient parts may conduce to continue the courſe of the fluids, from the arterial through the venal branches, may be collected from this circumſtance, that phyſicians recommend frictions in defect of muſcular motion, and in other particular caſes, to facilitate and accelerate the motion of the returning blood; nor can it be imagined, that the heart or arteries are altogether paſſive, or conſidered as mere channels to let the fluids paſs through in their circular courſe, which opinion has been inculcated by modern writers. If an hypotheſis is admitted, that they are actuated by a vibrative power, or that a ſubtile fluid or animal ſpirit is ſeparated in the brain, or that the blood itſelf conduces to the generation of animal ſpirit, as the circumvolutions of the carotid and cervical arteries and their extremities opening into and loſt in the medullary ſubſtance of the brain ſeem to indicate, it muſt be likewiſe admitted, that they have a reciprocal action upon each other as the correſpondent motions and pulſative powers of the brain, heart, and arteries evince; and whilſt this ætherial ſpirit is continually renewed by the circulation, it is ready to actuate and give motion to whatever parts it touches, whereſoever the will commands, like an emanation of electrical fire, which pervades every part.

To proceed, nature muſt revolt at the idea that the heart, (the chief organ of life) ſhould be merely paſſive, for, from its concentrick ſituation, it ſeems deſtined to refine the animated mixture of fluids, which, agitated by its concuſſions from one cell to another, are rendered more rarified and more ſpirituous, from whence their influence may be extended, as a ſpur through the whole vaſcular ſyſtem, venal and arterial, on which the elaſticity, irritability, and contractibility of the veſſels ſeem to depend, without which motion could not long ſubſiſt: ſuch influences may be ſuppoſed to preſide over, in, and through the animal frame, when it is conſidered, that in the heart is the ſeat of that vivifying fluid, that *primum vivens*, and *ultimum moriens*, and wherein the firſt red particle, the firſt animated vital ſpark begins to move, and where the laſt ceaſes.

In reſpect to the returning blood from the extremities, where the ramifications of the evaneſcent arteries are, as it were, loſt in minuteneſs, where there is no continuation or inoſculation of the veſſels perceptible, (by the beſt glaſſes in injected bodies) there the mouths of the recipient veins opening into the poroſities of the ſmalleſt fibres are ſuppoſed to begin, and take up the blood and carry it to the common current of the veins by branches, gradually increaſing in their bulk; and that the heart ſhould not want a ſupply, there are an infinite greater number of veins than of the arteries which tranſmit the maſs by the help of their infinite-communicating branches to the vena cava, from that to the right auricle of the heart, having the like properties of other fluids, preſſing and preſſed on every ſide, running on in every direction, *quâ datâ portâ*.

The oppoſers to this doctrine will ſay~~, how~~ can the blood be brought back by the veins, when the body is at reſt, when in ſleep there is a ceſſation or privation of all muſcular motion (that kind of leaping motion natural to the heart excepted?) The anſwer is, the continual action of the heart and arteries as already deſcribed, the elaſtick property of the air (the pabulum of life) inſpired into the lungs, not only keeping the blood in a due temperature between heat and cold, but its co-operating influence in bringing the particles of the blood in their courſe into contact with each other; elſe how happens it, when air is deſtroyed and rendered unelaſtick, we no longer breathe freely? or, that animals die in exhauſted receivers?

How happens it elſe, that patients dying with abſceſſes, or purulent ſpittings in the lungs, are ſeldom free from emphyſematous tumours in ſome part of the body? which are manifeſtly no more than flatulent deſtroyed air, eſcaped from the air veſſels. It is alſo obſerved, that the paſſage of the blood is impeded by too great a contraction of the cheſt, and a more than ordinary compreſſion of air on the lungs in ſome who accuſtom themſelves to play much on wind inſtruments, which, if continued, may induce a conſumption; and it is allowed, that air tainted with animal or vegetable putrefaction, is tantamount to air rendered noxious by animal reſpiration.

Our own feelings eaſily diſtinguiſh the different ſenſations air conveys, and its various effects; even common animals are ſo ſenſible of the bad qualities, that they carefully avoid reſpiring noxious air.*

The

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* The ancients were ſo particular in their obſervations of its good and bad properties, that they always recommended change of place to conſumptive perſons for the benefit of reſpiring a free air; for which reaſon they adviſed thoſe whoſe lungs were affected, to follow the plough, to receive into their lungs a kind of fixed air and the ſmell of new turned up earth.

Hippocrates

The conſtant oſcillation and contractile power of the fibres, agitated, as it were, by that ſubtile animating ſpirit, which adds vigour to the vital, ſenſitive, and motive faculties; alſo the horizontal poſition when reſting, and the endeavour all liquids have to recover an equilibrium, not to mention the advantage of a number of valves in different parts of the veins, which hinder the reflux of every preceding column.

There are inſtances enough to confirm the doctrine before recited: a familiar one preſents itſelf, that adds ſome illuſtration to this ſubject; that of laying one leg over the knee of the other, when in a ſitting poſture; the leg will then be obſerved to riſe and

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Hippocrates alſo carries this matter ſo far as to ſay, there is not only a refreſhment but a nouriſhment received from odors.

and fall by turns involuntarily: it is obvious this can ariſe from no other cauſe than the force of the arteries, the momentum of the blood, the preſſure and reſiſtance the blood meets with in paſſing through a larger part of a cone to a ſmaller, by which ſuch a weight is lifted up. Here reaſoning and fact concur.

A ſimilarity of circumſtances coincide in an aneuriſm in the arm, to occaſion it to lift up a certain weight, the ſame cauſes producing the ſame effects.

Analogous to this, is the ſenſation every one feels who has had an arm or leg amputated, when they imagine there is a weight at the fingers and toes which they want to raiſe. Another conſideration is, that the muſcular coat of the arteries, conſiſting of fleſhy fibres is naturally endowed with a proportionate power of contraction as the muſcles are, experiments having ſufficiently ſhewn it. Several authors affirm they have diſcovered a perfect irritability in the aorta by help of the electrical effluvia and in its deſcending part, as had often appeared in the heart; and that Verchuir more clearly demonſtrated the irritability of the arteries, which (before ſome eminent profeſſors) in the diſſection of a dog, he incited to contraction by help of a ſmall knife and needle.

It muſt be noticed in this place, the difference of the arterial from the venal blood in appearance; the firſt being more florid and rather thinner before the coaleſcence, the latter being of a darker hue and more grumous: this can be aſſignable to no other cauſe than the arterial blood being more attenuated by the repeated agitations in paſſing through the receſſes of the heart and the larger arteries with accelerated velocity, by being acted on by a vibrative power, or by that irritating nervous fluid, the fountain of all action, which renders more ſpirituous and volatile the circulating maſs; and impreſſes its vibrations on the whole animal ſyſtem; all which cauſes coincide to render the venal circulation complete, agreeable to the ideas of one of the greateſt writers, who ſays, that "mens humana in ſiniſtro ventriculo a naturâ inſita eſt, et reliquæ animæ imperat."

There appears alſo a particular diſpoſition of the capillary veſſels to favour the courſe of the blood through them, viſible enough in injected bodies, the communication being carried on by converging branches of arteries inoſculating with each other, and collateral ones converging and diverging again, forming various angles and anaſtomoſis with the veins. Nature ſeems to have formed the anaſtomoſis of the veſſels to coincide in ſuch manner, to retard the motion of the blood for the paſſage only of very ſmall globules, as Dr. Hales in his Hæmaſtaticks obſerves; for, admitting that the ſmall canals are cylindrical, and that they inoſculated without ſo many diviſions of the branches, the arterial and venal blood would be too near an equilibrium, and the finer capillary would then remain obſtructed; and, as the conſtitution is ſubject to heats, cold, and the different paſſions by which we are affected, the conſequence would be, that a lentor of the juices would creep on, followed by fits of a fever, whereby the blood is rapidly hurried through the aorta and larger ramifications of the arteries during the paroxyſm, (which will be longer or ſhorter as there is more or leſs febrile matter aſſimilated) till the capillary arteries in the extremities are diſengaged from their obſtructions, their coheſions broke through, the morbifick matter carried off by the proper emunctories, and a reſolution of the humours is effected.—Health then reſumes her wonted ſtation.

How far the colliſion of the ſides of the veſſels, the lateral and perpendicular preſſure of the blood (as fluids preſs *quâ quâ verſum*) may contribute to propel the blood through the capillary branches, may be gathered from the following data, viz. the more a canal is inflected, the greater the ſtroke; and where the curvature is greateſt, the force of the ſtroke is in a certain ratio increaſed.

SECT. II.

IF a retroſpect is taken to what has been ſaid, it may be allowed the connection is very perceptible between the arterial and venal circulation, from whence it will not be difficult to deduce the advantages ariſing from that knowledge when applied to practice. It has been mentioned, that a certain quantity of blood, more or leſs, (according to the bulk, age, ſtrength, temperament, &c.) is thrown out of the heart into the aorta by every contraction, and is ſuppoſed to move with a velocity through the arterial canals in a compounded ratio of the direct ratio of the orifices of the veſſels, and a reciprocal ratio of the reſiſtances.* Thus the blood paſſing out at an opened vein, finding no reſiſtance, is drove forward by every column before that of the artery anſwering to the vein opened, as alſo from the artery anſwering to the aorta, and from the aorta to the heart; now, in plethorick habits, when the veſſels are overcharged, or a rarefaction of the blood happens from any cauſe whatſoever, the velocity is increaſed beyond its due bounds, a depletion of the humours, by drawing off a ſurplus more or leſs in quantity conſiſtent with the nature of the diſeaſe and ſtrength of the patient, is abſolutely neceſſary, whereby, leſſening the abounding blood, the affected parts will be relieved; for in plethorick caſes, the left ventricle has leſs power to contract on account of the column of blood reſiſting in both the aorta aſcendens and deſcendens; but on opening a vein, the blood runs freely through the arterial canal, anſwering to the opened vein, and the left ventricle recovers the power of contracting in proportion as the reſiſtance is diminiſhed; the left ventricle more eaſily receives it, and the pulmonary vein opening into it, the motion of the blood is quickened through the pulmonary artery, which depletion proves a ſeaſonable relief in pleuretick complaints, peripneumonics, inflamed lungs, or ſhortneſs of breath, raiſes the pulſe again, which at that time is obſerved to be weak, depreſſed, and ſometimes intermitting, from an accumulation of blood which paſſes in a ſmall quantity from the right ventricle to the left, from thence to the aorta.

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* Dr. Martin, Auteur François.

Had attention in time been paid to ſuch circumſtances before mentioned, it might have ſaved a worthy prebend's life, (Dr. Haines, of Windſor) who, labouring with a ſhortneſs of breath, particularly at meal times, died in an aſthmatick fit. On opening his body, I found the lungs immenſely diſtended, the auricles and ventricles filled with blood, and what was very remarkable, the bottom of the aſpera arteria was, as it were, covered with a great number of gritty concreted ſubſtances, the ſize of millet ſeeds.

In the above deſcribed caſe, phlebotomy frequently repeated at the firſt attack of the diſeaſe, would probably have been his cure, before the grumous blood could have coaleſced to have formed ſuch concretions.

The incomparable Dr. Hervey alludes to ſuch kind of affections, when he ſays, "Patet quoque cur oppreſ-
"ſit et infarctis venis, pulmonum
"vel quibus morbo graviori læſa
"reſpiratio, adeo ſit periculoſum et
"ſignum læthale, nam ſi ventriculi
"ita diſtenti quod nil amplius ſan-
"guinis admittant, reſtitat cor a
"pulſu, et tenſum renitenſque pre-
"mendus, ſuffocatione mortem in-
"ducit."

'Tis a-pro-pos here alſo to remark, that this evacuation has its peculiar advantages in the beginning and in the exacerbations of the paroxyſms of acute inflammatory fevers, with great heat and a ſtrong pulſe; by emptying the veſſels, the diſtention of the veſſels is abated, univerſal perſpiration by help of warm diluting liquids ſucceeds, and the recrementitious parts of the blood are more eaſily carried off by the natural paſſages.

So likewiſe in excruciating pains affecting any parts, in moſt kind of hæmorrhages, from noſe, uterus, hæmorroides, or bladder, where the pulſe is often weak, depreſſed, and intermitting, by the uſe of this evacuation it becomes by degrees equable, the blood is divided, attenuated, and ſubtilized, and the tone of the veſſels reſtored. Nor is it uncommon, (as Dr. Hales and every practitioner muſt have obſerved) for people to loſe a great quantity of blood from wounds of the ſmall branches of arteries, without any great diminution of ſtrength, their ſlow diſcharge not preventing the larger arteries keeping full; and whilſt the veſſels continue their contractile and elaſtick power, the contained liquids endeavour to maintain a due balance.

Analogous to the above, Galen obſerves, "Uſu, nobis compertum "eſt, evacuationes ad lypothymiam "ductas ſæpe profuiſſe, ineuntibus "cauſis phlebotomia ad lypothymi-"am ducta refrigerat totum corpus "dico, febremque extinguit," &c.

The recollection of a caſe occurs to me, of one Beeſly's ſon, at Winkfield, who divided the cubital artery at the ball of the thumb by a glaſs bottle, round the extremities of which I ſeveral times paſſed a ligature, with ſtypticks, compreſs, and bandage, but every periodical fit of a fever burſt it open, by which he loſt a great quantity of blood each time, till in the intervals of the fits I gave him a quantity of bark, by which the hæmorrhage was ſtopped, and the wound healed.

But it is natural to enquire, in what quantities, or how often ſuch evacuation ſhould be repeated, or how is the line to be drawn between the exceſs and the contrary extreme?

A ſkilful practitioner will know what kind of fever or other diſorder requires it; that will depend on the patient's ſtrength, the nature of the pulſations, the contractile power of the veſſels in ſanguine habits and elaſtic fibres, the age, ſex, temperament, and other circumſtances; but it is obſervable ſometimes, that there are more pulſations in a given time in one arm than the other, which, there is reaſon to believe, muſt ariſe from a diviſion of the cubital artery above the elbow joint, contrary to Nature's uſual method of conſtructing the arteries. Such a divarication of the artery may produce the difference of the pulſation, as the blood taking a larger ſweep is ſomewhat longer in arriving at the extremity; this luſus naturæ I once met with in the right arm of an injected body I diſſected at Paris.

Again, this evacuation is confeſſedly uſeful in diſorders of the head and upper parts; the communication of the carotids and jugulars ſeem to favour the practice; the ſuperior intercoſtals too, ariſing from the ſubclavians, partake of the like benefit, agreeable to Hippocrates, who ſays, "Pulmonum et laterum "inflamationibus hæc inſtituenda "curatio."

For the ſame reaſons, in particular caſes, the opening the ſaphæna in the foot is uſeful; alſo in ſtubborn head-aches, opthalmics, a vertigo, comæ, apoplexy, eryſipelas in the face and other parts. The utility of opening the ſaphæna, is confirmed in ſuppreſſion of the menſtrual diſcharge; for the column of blood which is derived into the aorta deſcendens, adding to the weight and preſſure of that in the uterine veſſels, produces ſuch effects; and as the glandular ſecretions ſhould be the firſt object of care for the enjoyment of a good ſtate of health, ſo the decline of that diſcharge in the more delicate ſex, at a certain time, or which may happen ſooner or later, ſhould be particularly attended to, and aſſiſted by art, thouſands falling a ſacrifice to inattention or bad management; at that period the uterine veſſels are more loaded, become more rigid and leſs able to diſtend themſelves, and the collateral branches yielding more eaſily to diſtenſion, receiving the ſuperfluous blood, create that uneaſy fulneſs generally complained of about the region of the abdomen, in which caſe the legs ſometimes ſwell, and the breaſts retain their fulneſs longer than uſual, the patient becomes more inactive, the lymphaticks are affected, and dropſies often enſue. Sometimes in weak habits, where they have been ſubject to a fluor albus, where a ſudden ſuppreſſion of the uterine flux comes on, a tranſition from theſe glands is oftentimes made to the glands of the breaſt, or ſome other principal parts of the body, from whence ariſe ſchirrous and cancerous tumours, other times violent floodings, or the hæmorrhoidal veſſels burſt, or an habitual diarrhæa takes place. The continuance of the like ſymptoms is fraught with great danger, and tho' they may be relieved, 'tis better to prevent them; for this end phlebotomy challenges the firſt place, but muſt be repeated with caution, as the exceſs of this evacuation will bring on diſorders of as dangerous a nature as thoſe it was intended to relieve, ſo as to oblige the patient for months, and even much longer, to have recourſe to bark, chalybeates, mineral waters, and other reſtoratives, to recover a too debilitated ſtate. There are numberleſs other diſorders affecting the ſex at that time of their life, that require the direction and advice of a ſkilful phyſician.

Many other caſes occur in practice in which phlebotomy would be pernicious, particularly in all putrid fevers, in perſons of weak or lax fibres, or children whoſe pulſations (tho' quicker) are evidently owing to a laxity of the coats of the veſſels which make leſs reſiſtance; nor ſhould it be put in practice ſo often in ſwoonings, as it generally happens, without a manifeſt reaſon for admitting it; for when the ſanguine colour of the veins diſappears, and there is no appearance of motion, the contraction of the heart may fail at the approach of that languor which ſteals on, (more eſpecially on a large bleeding) and bad effects may follow.

In intermittents too, there would be great riſque, while the capillary veſſels are obſtructed, the elaſtick force weakened, the blood moving ſlow in the large veſſels, the heart would be bereft of its power, the rigors would increaſe, the capillaries would be in danger of collapſing, the blood would ceaſe to move, and the patient ceaſe to live.

The effects of the ambient cold on bodies, may be deduced from analogy, when the limbs are benumbed, livid, and ſcarce have any ſenſe of feeling, from the ſlowneſs of the returning blood to the heart; but as ſoon as the blood finds its way from the extreme parts, the uſe of the limbs is recovered, when friction has been uſed before they are brought to a fire.

Nature, which is regular in all her ways, is oppreſſed by ſudden changes, either by evacuation or repletion, food or drink, from extreme heat to cold, and the contrary, all which weaken the nervous parts, diſſipate the ſpirits, and extinguiſh life.

It is ſaid of thoſe who paſs over the Alps in winter, they loſe their noſe unleſs they firſt rub it with ſnow till pimples and a redneſs appear, before they preſent themſelves to a fire.

Upon the ſame principles, the ſudden deaths of travellers in ſevere ſnowy weather may be accounted for.

Thus alſo it is related, that Dionyſius, the tyrant, put out mens eyes by dragging them out of a dark priſon ſuddenly, and expoſing them to the full ſplendour of the ſun.

SECT. III.

THE ideas of the circulation having been hitherto extended, and ſome inconveniences reſulting from its irregularities pointed out, I ſhall endeavour to exemplify this doctrine by a few trials made on the ſerum and craſſimentum of the blood with a well-graduated thermometer of Fahrenheit, with as much accuracy as poſſible; thereby uniting the theoretick and practical parts of phyſick, which is intereſting to all who have at heart what is eſſential to their life and health, or that conſider themſelves as ſubjects of ſuch enquiries.

The ſerum or liquid in which the globules of blood ſwim, is well known to be fixed, and totally coagulated at 160 degrees of heat. In the firſt trial by Fahrenheit's ſcale, I found it grew turbid or muddy at 140 degrees, which heat is ſufficient to thicken the juices, ſo as to render them unfit for the purpoſes of nature, and to become mortal if not timely prevented; which ſtate can only be known by obſerving the ſymptoms of the diſeaſe, and number of pulſations in a given time, as it is certain the vibrations of the pulſe correſpond with the degrees of animal heat, of which I have had many proofs by applying Fahrenheit's mercurial thermometer to bodies in the higheſt fever, and alſo to thoſe in an healthful ſtate. Every man acquainted with the animal œconomy, the nature of the pulſe and its varieties, can judge to what pitch that heat will riſe without danger. Experiments prove, that ſerum kept in a continued determinate heat of 80 or 90 degrees, five or ſix days, will grow thinner, and diſpoſed to putrefaction; when that heat is increaſed ſome degrees, it will become thicker, for which reaſon, when on catching violent colds, it is on the point of ſtagnating in the obſtructed veſſels, and a fever ſeems approaching, recourſe is had to warm diluting liquors, plentifully drank, it is again reſolved, and the body reſtored to its uſual ſtate.

Was not this the caſe, our exiſtence would much ſooner have an end, though there is room to ſuppoſe the body will bear more heat than is generally imagined, for I have often found 130 pulſations in a minute; the coagulable lymph will then have about 100 degrees of heat, the ſerum will then be thin enough to carry on the courſe of the circulation, and prevent a ſeparation of its parts if aſſiſted in time by a proper regimen.

In truth, many fevers there are, wherein abſtinence would be a cure, and ſome caſes which would better ſhew the ſkill of the phyſician to give no medicines at all.

Οἱ ὑκεινῶς ἔκοντες τὰ σώματα ἐν τῇσι φαρμακειῃσι Καθαιρόμενοι, ἐκλύονται ταχέως, ϗ οἱ πογερῇ τροφῇ χρεόμενοι.

Some remedies externally applied, have ſimilar effects to thoſe internally taken.

Cantharides applied to the back or other parts, are known to affect the bladder.

Medicines are applied to the feet to promote expectoration, others to the abdomen, to produce a laxity of the bowels.

Some deleterious medicines ſhed their baneful influence through the conſtitution by outward application.

Even narcoticks, topically uſed, will induce a pleaſing oblivion of pain.

An adventitious heat introduced into the body, more eſpecially by a too free uſe of ſpirituous liquors, has the dire effect of ſuch as is produced by natural cauſes; for I found by the ſecond trial, on mixing two oz. of ſpirit of wine with eight oz. of ſerum, it grew turbid in a heat ſomewhat leſs than 130 degrees, and totally coagulated at 145 degrees. The pulſe of thoſe who make a free uſe of ſpirituous liquors, is obſerved to be exceeding quick; and where there has been a neceſſity for opening a vein, the texture of the blood has been generally found to be looſe and tender, and in a certain determinate heat will ſeparate, the globules running into a kind of grumous gore, and coagulable lymph into a thick maſs.

'Tis natural to think this diſpoſition of the blood may be the effect of an immoderate uſe of ſpirits, which may harden and contract the fibres of the ſmall veſſels, by degrees, to render them unfit for their office; the larger veſſels too, become leſs elaſtick, the fluids ſo diſpoſed that the animal functions are perverted, a temporary fever firſt attacks, ſucceeded and often ending in a hectick, the component parts of the blood are gradually diſunited, a ſeparation and total diſſolution of its parts follow, and the ſcene is cloſed.

Such are the effects of exhilarating fluids, which are too often indulged by young men, who, in the gaiety of heart, think nothing can hurt them.

Theſe are the natural conſequences from an active principle, an innate heat reſiding in all bodies, and from whatever cauſe it is put into action, natural effects muſt reſult, fluids paſſing through elaſtic tubes, having the property to generate heat by attrition in the body as well as out of the body; this attrition being a cauſe of warmth in our blood, we find a diminution of that warmth in our bodies, if the action and reaction of the veſſels is from any cauſe leſſened. In this ſtate the more delicate ſex feel a languor and chillineſs in large menſtruations; and 'tis obſerved, this innate heat from certain adventitious cauſes, produces a ſudden rarefaction in the blood, which ſhews itſelf in hæmorrhages from the noſe, mouth, uterus, or anus, without any other manifeſt cauſe.

Air likewiſe, heated to a certain degree, may produce a rarefaction of the blood: let the body be expoſed to air 90 degrees hot, the blood would acquire a heat of 150 degrees, a ſtate in which no animal could long exiſt.

Notwithſtanding this vivifying fluid on divers accidents and occaſions is liable to contract an inordinate heat, by which the ſizy ſtate is augmented, and the whole maſs thickened, yet Nature has allotted to man and beaſt a certain portion of coagulable lymph, to add firmneſs to its conſiſtence; for by its deficiency muſcular force and natural ſtrength is leſſened: the immortal Dr. Hervey reckons it the moſt light and ſpirituous part of the blood. Men of a hot temperament moſtly abound with it; it is even eſſential to ſome animals, to horſes made for ſwiftneſs or labour, and adds to their ſtrength; but when the quantity is increaſed beyond what is natural to the conſtitution, it creates a diſeaſe, appears in inflammatory caſes on the top of the blood in form of a thick buff-coloured coat, and gradually grows paler and thinner as the ſymptoms decline, and the heat is ſubdued.

Nature's conduct is juſt the reverſe in reſpect to many other animals: fiſh, ſerpents, and dormice, that ſleep away moſt part of the winter, owe their inactivity and torpor to the want of thoſe properties in the blood of ſtronger and more robuſt animals; on that account their blood not coagulating, it is always fit for circulation, though ſo ſlow as ſcarce to be perceptible, which may perhaps ſupply the want of food; and the periſtaltick motion of the bowels almoſt ceaſing, may account for the want of deſire to eat.

Again, ſome animals are only furniſhed with a ventricle to tranſmit their blood that very ſhort ſpace, and a ſtraight gut for conveyance to the extremities. Others, as badgers, hedgehogs, and moles, which follow the inſtinct implanted in them to carry their ſuſtenance into their holes and ſleep during froſty weather, but when the ſpring returns, that the ſeaſon grows warmer, their blood begins to be more rarified, their heart, or in ſome rather the ventricle, is more invigorated, and they recover their activity.

Certain kinds of fiſh too, put on different appearances in ſummer-time; in the eatable ſeaſons are beautifully ſpotted, their hearts being then more turgid and fluſhed with blood, which has been obſerved by diſſection while living, but their ſpots almoſt diſappear in winter.

In ſhort, there appears ſuch a conformity and exactneſs in the organization of the corporal and mental faculties of the animal kingdom, one may juſtly think with a late well known philoſopher, that there is a gradation in the ſcale of beings, from the higheſt order of the creation to the loweſt reptile creeping on the earth.

To proceed, the late ingenious anatomiſt, Mr. Hewſon, was of opinion, that ligatures on the arm conduced to the production of the coagulable lymph, that it was ſo much governed by a ſtate of the blood veſſels, as to be increaſed by emptying them, which opinion appears to me rather problematical, and which I cannot ſubſcribe to, having often found, (on opening a prominent vein without any ligature at all) the blood in inflammatory caſes equally ſizy, and ſcarce ever altered that appearance till after ſeveral bleedings repeated; but am inclined to think, what gave riſe to Mr. Hewſon's opinion was, in caſes where repeated bleedings might have reduced the patient below the common ſtandard, by which the action of the ſolids being too much weakened, the ſizy ſtate then increaſes, inſomuch that recourſe is often obliged to be had to cordials to ſupport nature, and to bring on a favourable criſis. This is a period when a conflict ſubſiſts between nature and the diſeaſe, that calls forth all poſſible attention; an error at this time, if it does not prove fatal, generally lengthens the diſeaſe, or lays a foundation for chronical diſtempers.

Critical days were ſo much obſerved by the ancients, that they refined upon that notion, and carried it to a very great length; they looked upon every ſeventh day, week, month, or year, as critical, and a kind of climacterick, and looked for changes on the ſeventh day among their ſick, that would either relieve or deſtroy them.

Galen de diebus decretoriis ſcribit, ſeptimum numerum decretoriorum omnium non numero et ordine ſed viribus, et dignitate primum eſſe; alſo remarks, that the ſeventh doubled produced another critical day, becauſe the moon then entered the oppoſite ſign; therefore he ordered thoſe two days chiefly to be looked on as the criſis of the diſtemper, inſomuch, that he compared the vicious quality of the ſixth day to a tyrant, and aſcribed the royal power to the ſeventh.

Therefore, Hieronymus ſays, the moſt ardent and acute fevers terminated in ſeven, twice ſeven, or thrice ſeven days.

Τὰ ὀξέα τὲν νȣσημάτον κρὶνεται ἐν ταῖς τεσσαρεσκαιδεκα ἡμέρησι. Hippoc. Aphor. xxiii. lib. ii.

He relates alſo, that Attalus, King of Pergamus, contracted a diſeaſe from the heat of the ſun, which killed him the ſeventh day.

So, from the beginning of the world it was ſuppoſed all toils and labours were to be given over; and all ſorts of works began under an heavenly influence, were carried on with ſucceſs by the ſeventh number.

Philo, the philoſopher, alſo ſays, the proportion of the ſeventh number is real muſick; that it comprehended all harmony, all proportions, arithmetical, geometrical, and muſical. Who, therefore, ſays he, would not conclude with Cicero, that the ſeventh number was the bond of all things? And with Hippocrates, that the ages of men were laid out according to the proportion of that number? And that human bodies, from the firſt formation in the womb, received ſome change on the ſeventh day, ſeventh month, or ſeventh year?

And again, with Philo, that the ſeventh was a perfect number, a world conſecrated to God, was the meaſure of time, order and reſt, and indeed a ſymbol of the whole and every part thereof, as Pythagoras, Plato, Ariſtotle, Cyprianus, and others affirm; from whoſe writings it is gathered, that thoſe who were Chriſtians, as Irenæus, Hilarius, Bede, Juſtin, Polycarp, and others were of this opinion, conjecturing from the world being made in ſix days, that it would laſt ſix thouſand years, and that the ſeven thouſandth would be an eternal ſabbath, thinking the account of what was paſt was a revelation or prophecy of the future.

Aulus Gellius mentions, that Octavius Auguſtus ſent a letter to his ſtep-ſon to this effect: "Rejoice "with me, my ſon, for I have paſt "over that deadly year and enemy "to old age, threeſcore and three, "in which number the ſevenths "and ninths do concur."

There were innumerable inſtances of this kind; their prepoſſeſſions in favour of the number ſeven influenced all their actions.

In reſpect to the criſis of fevers, the moderns agree perfectly with the ancients in opinion, that if the diſeaſe does not terminate the ſeventh, eleventh, fourteenth, ſeventeenth, or twenty-firſt, a fatal relapſe will follow, or end in a chronical diſtemper; the ſymptoms of which appear by a languor, want of appetite, dryneſs in the mouth, &c. for which we have the authority of Hippocrates:

Τὰ ἐνκατα λιμπανόμενα ἐν τῆσι νούσοισι μετὰ κρίσιν ὑποστροφὰς ποίηειν εἴωθιν.

But to return; it is obſervable that in inflammatory fevers, peripneumonics, pleuriſies, eryſipelas, acute rheumatiſms, and more of that tribe, before bleedings take place, the ſyſtaltick motion of the heart and arteries, the inflammation and the coagulable lymph are increaſed, the pulſe will ſeldom be found to have leſs than 100 vibrations in a minute, the coagulable lymph will then have about 75 degrees of heat, and ſuppoſing the pulſe raiſed to 110 vibrations, the ſizy coagulable lymph will then acquire 82. 5 deg. or thereabout, which will rarely prove mortal under proper management.

From what has been ſaid, the uſe of phlebotomy is not meant to be inculcated in every fever, ſome ſymptoms may appear that indicate the contrary or forbid repetitions; for, when a ſizy cruſt on the top of the blood is joined with a craſſimentum of ſo looſe a texture as will ſcarce coagulate, when the tribe of ſymptoms accompanying nervous, putrid, and malignant fevers ſhew themſelves, though heat is uſually a predominant ſymptom with a quick and weak pulſe, repeated bleedings on ſuch occaſions would ſo much leſſen the vis vitæ, (at that time too much impaired) the fluidity of the blood would be no longer preſerved, its particles broken and ſeparated ſo as to put it out of the power of art to afford any aſſiſtance.

The third trial was made by adding two drachms of the fineſt powder of nitre to eight ounces of freſh drawn ſerum, which grew turbid at 155, and coagulated at 175 degrees of heat. After ſeveral trials in like manner of the neutral ſalts, the reſult was the ſame, the ſalts bearing 15 degrees more heat than pure ſerum alone; the nature of which is fully ſhewn in Dr. Pringle's Appendix to his Obſervations on Diſeaſes of the Army, where is ſpecified in a table, their antiſeptick qualities and comparative powers of reſiſting putrefaction.

The utility of nitre is very manifeſt, given in ſmall quantities in inflamed lungs as well as other inflammatory caſes, by cooling, and, as it were, regenerating freſh air, which inexpreſſible and pleaſing ſenſation every one feels in the lungs by removing from a hot air to a cooler. What adds to the benefit of this medicine, is the adminiſtering it with ſomething of a ſaccharine or ſaponaceous quality, to prevent it from running off too haſtily through the bowels or kidneys; for in that caſe the ſerous parts of the blood are carried off, and the globules not being able to paſs freely through the capillary veſſels, ſtagnate and run into moleculæ; the coagulable lymph increaſing, and adding by its viſcidity to the obſtruction, produce intenſe heat, great pain, and oftentimes abſceſſes.

I have often experienced ſalutary effects of this medicine, tho' there are thoſe who affect to believe no benefit can ariſe from its uſe, probably from prejudice, that novelty and faſhion (which are now very prevalent in phyſick) do not recommend it.

The fourth trial was made with two ounces of tincture of bark and eight ounces of freſh ſerum, which was in a ſtate of coagulation at about 165 or 170 degrees.

It was the ſame alſo with the Alexipharmick tincture, both bearing ſome degrees more heat than pure ſerum.

Among the various hiſtories of the good effects of the bark, I cannot omit mentioning one as a proof of its antiſeptick qualities, which was very conſpicuous in the caſe of one Stevens, of Datchet, aged 70, who was ſeized with a numbneſs in the fingers of both hands, ſeveral of which mortified and threw off the firſt joints, whom, by help of warm dreſſings, the bark, opiates, and cordials, I perfectly cured, and he lived ſeveral years after.

On the fifth trial, to the ſame quantity of freſh drawn ſerum was added two ounces of diſtilled vinegar, which bore about 15 or 20 degrees more heat than pure ſerum; from whence an inference may be drawn of how much uſe vegetable acids are in reſiſting putrefaction, by cooling the heat, allaying thirſt, combining the looſe texture of the blood, and thereby preventing a ſeparation of its parts.

Common vinegar mixed with ſerum in the ſame proportion, had the ſame effect.

Theſe I was induced to make trial of from an information I received from a ſurgeon of eminence, that it was a practice in the German hoſpitals,

tals, eſpecially in the Auſtrian army, to give the ſoldiers milk and vinegar, mixed together equally in a veſſel, which the phyſicians ordered the men to drink of for their common drink for the putrid bloody flux that raged among them.

The ſixth trial was made by putting two drachms of the fine powdered ſal ammoniac into eight ounces of ſerum, which kept its fluidity to 170 or near 180 degrees of heat, which circumſtance is rather a proof of its cooling and attenuating quality, and which induced me to adminiſter it in very ſmall quantities given in pectoral drink to the detachments at Windſor, who were very often affected with pleuretick and other inflammatory diſtempers.

The ſeventh trial was by mixing ſpirit of hartſhorn with freſh ſerum in the ſame proportions, and likewiſe ſpirit of ſal ammoniac in the ſame manner, which both kept their fluidity to about 170 degrees of heat; all which will point out to a certain degree the properties of medicines, and help to form a judgment of their internal uſe, how far, or in what proportions they may be given to aſſiſt nature to get rid of ills inimical to the human frame.

SECT. IV.

TO purſue theſe ideas further, health being the firſt grand object of our care, a conſideration of what has been ſaid will naturally ariſe, of what conſequence it is to keep the human machine in ſuch a temperate ſtate as to be capable of doing the common offices of life with chearfulneſs and pleaſure: prevention ſhould take place of cure. A common ſuggeſtion ariſes, that moſt diſorders have their beginnings from repletion, and are curable by inanition; but diſeaſes, ſometimes through inattention or otherways, take deep root, and ſtand in need of the advice and direction of thoſe ſkilled in the medical art, to lead

Nature by the hand to oppoſe the progreſs of the diſtemper; nor indeed is ſhe wanting in finding out ways to relieve herſelf when oppreſſed.

The circulation not being the ſame at all times, or in all parts, (as hinted before) being ſwifter or ſlower according to the ſtate of the veſſels, the abundance of the blood, or its obſtructions, the glandular ſyſtem is more or leſs affected.

Dr. Keil, Dr. Hales, and others have obſerved, if it was not for the ſlowneſs of the circulation in particular parts, the ſecretion of certain humours would not be performed: the bile is one comes under the ſame predicament. From the irregular ſtate or flux of this humour, ſpring many ills, curable by a detergent regimen; and if the cyſtick duct is ſo obſtructed as to hinder the paſſage of the bile into the inteſtines, it takes another route and diffuſes itſelf over the whole ſurface, of a yellow colour, more or leſs heightened, as more or leſs bile is carried into the habit of body.

From a diſtempered ſource of bile may be attributed the formation of concretions in the gall bladder, commonly called gall ſtones. An inſtance of this I had on opening the body of Mr. Dolben, Minor Canon of Windſor, who languiſhed a long time in great agony; the gall bladder was much diſtended, and contained 150 concreted triangular ſubſtances, the bigneſs of peas, ſwimming in a greeniſh ichor; part of the meſentery next to it was very much inflamed.

The diſeaſed maſs paſſing with difficulty through the narrow meanders and receſſes of the liver, the divarications and converging branches of the arteries being too ſmall to communicate a ſufficient impulſe to the portal branches, makes it liable to the formation of matter in its cells and parenchyma, to jaundice, dropſy, hydatides, ſchirrous tumors, &c. &c.

The organization of veſſels leading to and from the liver, and their junction with others, give a very conſpicuous proof of the œconomy and contrivance of nature; thus the conſtitution is relieved from a plethora, and ſuperfluities carried off by the communication of the vena cava with the vena ſacra, and running into the inteſtinum rectum, by which the hæmorrhoids are produced, and often prove a ſeaſonable relief.

The connection of the hæmorrhoidal with the uterine veſſels too, is a favourable circumſtance to women in a deficiency of the periodical diſcharge, which frequently finds its way through thoſe paſſages.

Affections of the meſentery, ſpleen, and liver alſo, are ſometimes carried off by branches of the vena porta, communicating with others leading into the inteſtinum rectum, and ſphincter anus.

Hypochondriacks are by theſe means alſo relieved.

This ſhould be a hint to perſons not to repel by topical applications the hæmorrhoids, or ſuppreſs any natural or artificial diſcharge too ſuddenly

Among the chronical diſtempers, the offspring of ſuch diſpoſitions in the animal frame, will be the hypochondriacal, the moſt pitiable, tho' often treated as imaginary; the concurring circumſtances in their production, ſeem principally to be an irregularity of the non-naturals, an interrupted courſe of the circulation, an ill diſpoſition in general of the humours, and a preternatural affection of the organs of digeſtion, thoſe patients complaining of numberleſs ills not to be deſcribed, particularly when lying in a ſupine poſture, of a weight on the cheſt and hypochondria, with oppreſſion of ſpirits, probably from accumulated blood in the diaſtole of the heart, which is bereft of the power of contracting to drive forward each ſucceeding column in due order.

Theſe conſiderations lead to an inference how conſequential it is to the proper regulation of the bodily frame, to preſerve a due poiſe between the contending paſſions of grief, joy, love, revenge, anger, cares and anxieties, that lay hold on the human heart.

The nervous ſyſtem apparently comes in for a ſhare in theſe ſcenes; the connection of the par vagum of the eighth pair of nerves with the intercoſtal and phrenick nerves, favouring this opinion, whether acting by conſtriction or whatever elſe ſuſpends muſcular motion, the loſs or inability of ſpeech is accounted for, the nerves acting by conſent, as it were, like the ſtrings of a muſical inſtrument, vibrating in uniſon with each other. There are caſes too on record, that ſome who have had a concuſſion of the brain, have loſt the power of taſting and ſmelling their whole lives after.

Fear and ſadneſs are alſo affections which ſoon alter the ſtate of the circulating juices, induce obſtructions and chronical diſtempers, and when continued long, bring on a ſettled melancholy; for the operations of the mind follow the temperature of the body and humors, clear ſpirits preſenting to the mind objects under a pleaſant form, dark ideas exhibiting ſad and dreadful images; perſons ſo affected appearing ſometimes melancholy, ſometimes laughing, being alternately oppreſſed.

Many have been known to fall victims to the ſudden effects of the various paſſions incident to mankind. Hiſtory tells us, that a Roman Emperor, Valentinian the Firſt, being provoked at the incurſions of ſome barbarous nations of Germany, called Quadi and Marcomanni, and alſo at the wretched appearance of their ambaſſadors ſent to deprecate his wrath, fell into ſuch a rage, that in a few hours he bled to death at the noſe, notwithſtanding all the diverſion his phyſicians could make by bleedings in both his arms.

Much later inſtances of this kind are on record. The cauſes of ſuch effects are eaſily deduced; but theſe paſſions are all ſo elegantly touched on by Sir George Baker in his Diſſertation de Affectibus Animi et Morbis inde Oriundis, that there is no need to enlarge on them.

The action of the nerves on the muſcles being the *primum mobile* of muſcular motion, is the cauſe of wonderful effects; thoſe occurring moſt naturally to us, are the common actions of life, ſitting, lying down, running, walking, leaping, and all motions the different contortions of the limbs are capable of producing; no ſooner is the mind determined on any, but it is implicitly obeyed; it ſeems as if motion was governed by mathematical laws: we cannot move out of the center of gravity without bordering upon inſecurity; if ſlipping or riſing from our chair we depart from that center, we come to the ground. There is a kind of mechanical geometry, (to uſe that phraſe) without the uſe of which we could not riſe, walk, run, nor move a hand; for which reaſon Galen calls the hand Οργανον Οργανῶν, the Inſtrument of Inſtruments.

Hence is ſeen the difficulty of walking up hill, and in deſcending, and what follows, when the weight exceeds that of the fulcrum, or that we depart from the center of gravity.

Hence it is perceptible by familiar inſtances, whatever preſſes on the nerves, renders the muſcles connected with them inactive, as is obſerved by leaning on the nerve at the back of the elbow, which benumbs the arm till the poſition is altered; the ſame kind of ſenſation is felt, and an inability of walking, when the ſciatick nerve is preſſed on, or by any diſtemper affected.

In contemplating theſe ſubjects, we find reaſon enough to be thankful to the Author of our being, and with the Pſalmiſt, to praiſe him in our down-lyings and our up-riſings.

To continue :—In the former part it has been evinced, how much health depends on a regulation of the conſtitution, and how readily a deviation introduces a cachexy or ill diſpoſition of the humors, firſt announced by a weight or ſenſation of heavineſs in the body, by which they are rendered impervious thro' the veſſels, the ſecretions are at a ſtop, the nervous ſyſtem and muſcular motion impaired, and indeed the whole animal functions perverted; hence the languor, liſtneſſneſs, and laſſitude, ſo often complained of on the firſt onſet of fevers, and continuance through the ſeveral ſtages; more ſo, if attended with any putridity. On recovery, too, from ſuch fevers, a laſſitude ſometimes remains, owing to an imperfect criſis, a retention of part of the morbifick matter, and a general weakneſs of the body, frequently terminating in a maraſmus.

It will be ſeen how much the dietetick part is to be attended to likewiſe: Hippocrates recommends the refreſhing and repairing nature by drinkables particularly, in preference to eatables, laying a more than ordinary ſtreſs on aſſes milk, which, by its thinneſs, more eaſily enters the lank and weakened veſſels, (almoſt in a ſtate of collapſing) deterges whilſt it affords the greateſt nouriſhment; for the ſame reaſon, ſoft liquid aliments of eaſy digeſtion ſhould be adhered to. Ρᾶον α πληροῦσθαι ϖοτοῦ, ἢ σιτίου.

Practice and obſervations will furniſh lights enough to an intelligent mind to diſtinguiſh the nature and motion of the blood, the ſtate of the veſſels, their pulſative powers, the frequency, ſlowneſs and diverſity of the pulſations, to what cauſes owing, and what inferences may be drawn reſpecting the cure of acute febrile diſtempers, ariſing from a plethora, or general fulneſs of the veſſels, an inflammatory denſity of the blood, pleuretick and pulmonary complaints, to point out the good effects of a well-timed derivation; but as a certain denſity and conſiſtence is eſſential to health, it is neceſſary to guard againſt drawing off great quantities ſuddenly in ſuppoſed warrantable caſes, a laxity of the fibres in weak habits being generally an objection to ſuch practice, ſeeing that the diameters of the veſſels will decreaſe in a certain proportion as that derivation is encreaſed, from whence a too great attenuation may affect the glandular ſyſtem, create a greater acrimony of the juices, and reduce the habit of body below the ſtandard peculiar to the well-being of the conſtitution.

Schirrous tumours (really formed) become worſe by ſuch repeated derivations, and nearer degenerating into a carcinomatous ſtate, being not many removes from a gangrene, which, with many others, want ſome aſſiſtance from medicine, and whoſe indications of cure conſiſt chiefly in every kind of exerciſe that gives a ſhake to the human frame, in the regulation of the non-naturals, rectifying the dyſcraſis, diſſolving the lentor and viſcidity of the humors, and carrying off the morbid irritating matter.

The pathognomonick ſymptoms of moſt kinds of fevers are too well known to need any enumeration; their different types, the exacerbations, and variations of the pulſe require a nice attention; the pulſe riſing ſometimes ſuddenly to 100 or 110 in a minute, and as ſuddenly almoſt ſubſiding; which ſhews how much the ancients were miſtaken, when they ſuppoſed life could not be long ſuſtained after ſuch a period. Intermittents in the ſpring are obſerved to go off by the ſtrength of the vital powers without any medicinal aſſiſtance, very common among indigent people; and many diſorders there are carried off by critical diſcharges that want no help from medicine; the return of the periodical diſcharge in the more delicate ſex, has afforded an unexpected relief in fits of the gout and other illneſſes; even fevers have been a cure in ſome obſtinate caſes. Hippocr. lib. vi. Aphor. 51.

It is of great conſequence to diſtinguiſh nicely all ſymptomatic diſorders, which do not admit of derivation by phlebotomy, as well as fevers of the malignant, putrid, or nervous tribe, it not being admiſſible in theſe unleſs in very peculiar caſes, from a deficiency of the red particles, and the want of the vis vitæ neceſſary to ſuſtain the loſs of depletion; but in its ſtead, nature's purpoſes might be better anſwered by repeated draughts of generous wine, the beſt of cordials. We have here the authority of Galen, "Qui ergo ſuccus corpus fatigat, is "purgari debet, ut ſi ſerum ſan-"guinis modum exceſſerit, vacu-

“ etur, ſi flatus, hæc, et non ſanguis
“ educatur.”

One may venture to aſſert, to the indiſcriminate uſe of phlebotomy in ſome fevers, operating againſt the very firſt intention of cure, and to the omiſſion of it in other fevers, which indicate an abſolute neceſſity for its practice, as many have fallen victims as to the ſword.

From what has been ſaid it muſt appear, how eſſential experience and practice are to form a judgment of the ſtate of the conſtitution.

From hence may be deduced the method of fixing the ideas of the degrees, differences, variations, the riſe and depreſſions of the pulſe, (the grand criterions of diſtinction in febrile caſes,) Hence alſo may be known to what cauſes ſuch ſymptoms are owing, and the remedies to apply.

In the whole, from hence it will appear how neceſſary an adequate knowledge of the animal œconomy, of the circulation of the blood, and its diſtribution through the vaſcular ſyſtem, is, to form a practical man, and that only time and experience can enable him to poſſeſs the wiſhed for ſatisfaction of diſtinguiſhing the poſſibility of a recovery, or duration of the patient's exiſtence.

FINIS.